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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.				
10/802,141	03/17/2004	Nagesh Sonti	215P011709-US (PAR)	3267				
2512 PERMAN & GREEN 425 POST ROAD FAIRFIELD, CT 06824	7590 09/24/2007		<table border="1"><tr><td colspan="2">EXAMINER</td></tr><tr><td colspan="2">KESSLER, CHRISTOPHER S</td></tr></table>		EXAMINER		KESSLER, CHRISTOPHER S	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10 September 2007 has been entered.

Oath/Declaration

2. The Examiner acknowledges the substitute Declaration filed 10 September 2007 which lists the citizenship of each inventor.

Status of Claims

3. Responsive to the amendment filed 10 September 2007, Claims 19, 35, 41 and 43 are amended, and claims 1-18, 33, 34, 36 and 40 have been cancelled. Claims 19-32, 35, 37-39 and 41-47 are currently under examination.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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5. Claims 19-24, 27-30 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 5,451,275 issued to Amateau et al. (hereinafter "Amateau"), in view of U. S. Patent 5,711,187 issued to Cole et al. (hereinafter "Cole").

Regarding claim 19, Amateau describes the invention substantially as claimed.

Amateau describes a method comprising the steps of

- (a) heating a metal workpiece in the form of a near net shaped gear blank having gear teeth surfaces above its critical temperature to obtain an austenitic structure throughout its surfaces;
- (b) isothermally quenching the workpiece at a rate greater than the critical cooling rate of its surfaces to a uniform metastable austenitic temperature just above the martensitic transformation temperature;
- (c) rolling the gear teeth surfaces of the workpiece to a desired outer peripheral profiled shape between opposed dies, each die having an outer peripheral profiled surface, while holding the workpiece at the uniform metastable austenitic temperature. the gear teeth surfaces undergoing densification. plastic deformation and strengthening as a result of the rolling operation; and
- (d) cooling the workpiece through the martensitic range to thereby harden the surfaces of the gear teeth.

More specifically, in claim 1, Amateau describes;

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- (b) heating a workpiece in the form of a near net shaped gear blank having carburized gear tooth surfaces above its critical temperature to obtain an austenitic structure throughout its carburized surfaces;
- (c) isothermally quenching the gear blank at a rate greater than the critical cooling rate of its carburized surfaces to a uniform metastable austenitic temperature just above the martensitic transformation temperature;
- (d) holding the temperature of the gear blank at said uniform temperature while rolling the gear tooth surfaces between a pair of diametrically opposed rolling gear dies to a desired shape before martensitic transformation occurs; and
- (e) cooling the gear through the martensitic range for the carburized gear surfaces to harden the gear surfaces.

In regard to the limitations of rolling to a substantially finished profile, and final shaping, the "desired profile" taught by Amateau meets these limitations, when it is desired to have a finished gear. Further, Amateau teaches that the gear blank work piece is made larger than the specified finished size so that after processing it will have the correct finished size (see cols. 5-6, for example).

Amateau does not disclose wherein the workpiece is a powder metal workpiece.

Cole teaches that a near net shaped gear blank is formed from a metal powder, and subsequently worked using a rolling machine to form a gear wheel for a power transmission (see col. 1, line 8-col. 2, line 65). It would have been obvious to one of ordinary skill in the art at time of invention to substitute a powder metal gear blank as taught by Cole for the hobbed gear blank disclosed in Amateau, in order to tailor the steel composition to particular applications, as taught by Cole (see col. 1, line 63-col. 2, line 41).

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Regarding claims 20-24, 27-30 and 47, Amateau in view of Cole is applied to the claims as stated in the Prior Office Action.

6. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amateau in view of Cole as applied to claim 21 above, and further in view of Applicant's Admitted Prior Art.

Amateau, Cole and AAPA are applied to the claims as stated in a prior Office Action.

7. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amateau in view of Cole, in further view of U.S. Patent 4,972,735 issued to Torii et al. (hereinafter "Torii").

Amateau, Cole and Torii are applied to the claims as stated in the prior Office Action.

8. Claims 35, 37-39 and 41-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 6,779,270 issued to Sonti et al. (hereinafter "Sonti"), in view of Cole.

Regarding claim 35, Sonti teaches the invention substantially as claimed. Sonti teaches in claim 1,

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1. A method of producing a full form net shape roll finished contacting machine element from a near net shape workpiece of wrought or forged steel having an initial outer peripheral contoured surface and including a plurality of teeth, each having a tooth flank with a nominally involute surface and a root/fillet region with a trochoidal surface, the method comprising the steps of:

rotatably supporting on a first axis a rolling die having an outer peripheral contoured surface extending between generally parallel spaced lateral surfaces transverse to the first axis, the rolling die including a plurality of teeth, each including a tooth flank with opposed involute surfaces and a tooth tip surface;

rotatably supporting the workpiece on a second axis distant from and parallel to the first axis;

advancing the rolling die in an in-feed direction generally perpendicular to the first and second axes such that the rolling die meshingly engages with the workpiece,

rotating the rolling die about the first axis while engaged with the workpiece;

while performing step (d), maintaining continuous conjugacy between the rolling die and the workpiece with the involute surface of each tooth of the rolling die engaging the involute surface of a mating tooth of the workpiece and the tooth tip of the rolling die engaging the trochoidal root/fillet surface between adjacent mating teeth of the workpiece to effect material flow along the outer peripheral contoured surface;

continuing to advance the rolling die in the in-feed direction thereby deforming the surface of each tooth flank and of a corresponding root/fillet region until a final net shape of each tooth and root/fillet region is achieved, and

continuing to perform all of the preceding steps with the rolling die and workpiece meshingly engaged, thereby deforming the involute and trochoidal root/fillet surfaces of all of the teeth of the workpiece resulting in a final net shaped machine element.

Sonti does not teach wherein the workpiece is a powder metal workpiece, or

(e) rolling the gear teeth surfaces of the workpiece to a desired outer peripheral profiled shape while engaged with the rolling die having an outer peripheral profiled surface while holding the workpiece at the uniform metastable austenitic temperature the gear teeth surfaces undergoing densification, plastic deformation, and strengthening as a result of the rolling and sliding operation.

Cole teaches that a near net shaped gear blank is formed from a metal powder, and subsequently worked using a rolling machine to form a gear wheel for a power transmission (see col. 1, line 8-col. 2, line 65). It would have been obvious to one of ordinary skill in the art at time of invention to substitute a powder metal gear blank as taught by Cole for the forged gear blank disclosed in Sonti, in order to tailor the steel composition to particular applications, as taught by Cole (see col. 1, line 63-col. 2, line 41).

The limitation of the gear teeth surfaces undergoing densification, plastic deformation, and strengthening as a result of the rolling and sliding operation. Would be inherent in the process of Sonti shown above, if that step were performed as stated above on a powder metal gear blank (see MPEP §2112). Compaction under high temperature (hot working) is well established in the art to cause pores of a sintered PM workpiece to collapse and to cause the workpiece to plastically deform. The closing of pores is further known to cause strengthening in powder metal workpieces.

In regard to the limitations of rolling to a substantially finished profile, and final shaping, the "desired profile" taught by Sonti meets these limitations, when it is desired to have a finished gear. Further, Sonti teaches that the gear blank work piece is made larger than the specified finished size so that after processing it will have the correct finished size (see cols. 4-5, for example).

Regarding claims 37-39 and 41-46, Sonti in view of Cole is applied to the claims as stated in the prior Office Action.

Response to Arguments

9. Applicant's arguments filed 10 September 2007 have been fully considered but they are not persuasive. Applicant has argued that the methods of Cole and Amateau are not compatible because the method of Amateau applies only to wrought and/or forged gear wheels (see Remarks, pp.15-16). This is not found persuasive for the reasons stated in the prior Office Action. The Examiner never suggested that Amateau disclosed a powdered gear blank be used. The Examiner suggested that it would have been obvious to one of ordinary skill in the art that Amateau could be altered to use a powder metal gear blank instead of a wrought steel gear blank. Applicant has provided no substantive evidence that such an alteration would not result in the process as claimed. Applicant has stated that features of the instant process are not disclosed by Cole. The Examiner agrees, however, the rejection was based on the method of Amateau in view of Cole.

Applicant has stated in the Remarks at page 18,

Moreover, one skilled in the art would not merely apply the technique of Cole or substitute the elements of Cole into Amateau.

The processes of forming wrought steel gears and powder metal gears and the characteristics of wrought steel gears and powder metal gears are so different that one skilled in the art would not merely substitute the powder metal gear of Cole for the wrought steel gear of Amateau.

The Examiner disagrees with this statement. In the instant case, both Amateau and Cole are drawn to gear wheel rolling in order to create precision gear components.

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Also, the Examiner never suggested substituting the gear of Cole for the gear of Amateau, but suggested that it would have been obvious to have replaced the *gear blank* of Amateau with the powder metal *gear blank* of Cole. Applicant further states "The method described in Amateau applies only to wrought and/or forged steels." The Examiner agrees that Amateau does not envision powder metal gear blanks. This is one reason why Amateau does not anticipate the claims of the instant case. However, the instant claims are obvious over Amateau in view of Cole, and the same types of compaction as claimed would be obvious to one of ordinary skill in the art if a powder metal gear blank were used in the process of Amateau, as stated in prior Office Actions.

In response to applicant's argument based upon the age of the references, contentions that the reference patents are old are not impressive absent a showing that the art tried and failed to solve the same problem notwithstanding its presumed knowledge of the references. See *In re Wright*, 569 F.2d 1124, 193 USPQ 332 (CCPA 1977):

In response to applicant's argument that Torii is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Torii is merely relied upon to demonstrate that the manufacture of power transmission components would obviously include manufacture of intersecting axis gears such as a hypoid gear, for example. Torii is clearly applicable to the manufacture of power

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transmission components as it discloses the finished product, i.e., a power transmission assembly.

Applicant has filed a declaration under 37 CFR 1.132. Applicants point out the differences between the processes of Sonti and Amateau and the Cole reference. While the Examiner agrees that the Cole process is not the equivalent of the processes taught by Sonti and Amateau, the claims of the instant case would still be obvious over Sonti or Amateau in view of Cole. The statements that Sonti or Amateau do not anticipate radial compaction are not impressive. As stated in said declaration, "no radial compaction of the material is possible" while using a wrought gear blank (see p. 4 of the declaration). If the wrought gear blank of Amateau were replaced with a powder metal gear blank as taught by Cole, radial compaction would be possible, and would indeed take place, as stated in the prior Office Action.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Kessler whose telephone number is (571) 272-6510. The examiner can normally be reached on Mon-Fri, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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